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ME003A - Advanced Visualisation Methods
Assignment 3 - Tactilization

Report, Assignment 3 – Tactilization
Anton Pålsson Abrahamsson:

Tactilizing life expectancy in the United States between 1950 and 1970 using Triangles.

Visualizations are commonly used in order to convey information to people, in large part because they tend to think in terms of visuals and this makes it easier for them to understand data (Ware 2020, pp 1- 4). However, this particular assignment has been in creating tactilizations, a way of communicating data in the form of touch and feel rather than visuals (Hogan, Hinrichs and Hornecker 2017), although it is worth noting that some visual elements are necessary for this particular assignment.

In this assignment, I have made use of Haply's tactilzation device, a piece of equipment based on Arduino's sensors and the Processing program using the Java programming language, in order to create triangles representing the life expectancy in the United States between 1950 and 1970, with the primary point of comparison between male, female and in general. The model I am using is nothing new and cannot be considered research in and of itself, which means there isn't going to bring much serious insight into the field (Zhao et al 2022), but will regardless serve as a demonstration of the Haply tool. These are based on three different data sets from gapminder. The difference between these points of data is rather minor, as such the triangles created do not look very different from each other and thus would not work well as pure visualization, I have however added a friction force to these triangles which can be felt using the device.

Interestingly enough, in order to make the data depict the triangles in a reasonable scale, I had to move the decimals of years and age in order for the visual element to be shown:

```
float[] years = {1.95, 1.96, 1.97};
float[] ExpAll = {6.83,  7.01,  7.09};
float[] ExpM = {6.54 , 6.66 , 6.7};
float[] ExpF = {7.1,  7.33,  7.46};
float[] All = {1};
```

"All" in this case is a generic value I only added to complete the triangle, it has no relevant information. I am sure that if I had received more time to learn Java, the Haply tool and Processing in general, I could have better applied this data than I did. Regardless, it still functions perfectly fine for the intended purpose.

While I must stress that this particular tactilization is pure made for demonstrative purposes and is not intended to be taken seriously, which is why the force is not proportional to the difference between the data, it would not have been noticeable if it was. What is more important here is symbolism that someone might be able to understand (Kidron and Tall 2014), which in this case happens to be that the friction for the female triangle is stronger than the force on the male triangle, which is meant to represent that while these triangles may look almost identical, there is still a difference between them, with the triangle for all has no friction at all in order to show how the

difference may not be perceived at all in visual form. In terms of visuals themselves, I opted to colour code the triangles in order to better be clear on which triangle represents what, with light blue representing males, pink representing females and purple representing all. In case anyone does not understand the colour coding, I provided an explanation of them in the visual field by simply adding this code:

```
 textSize(20);
  text("US Life expectancy, 1950-1970", 50, 50);
fill(51, 180, 255);
textSize(20);
  text("Blue = Male", 50, 70);
fill(255, 102, 102);
textSize(20);
  text( "Pink = Female", 50, 90);
fill(102, 0, 153);
textSize(20);
  text("Purple = All", 50, 110);
fill(0);
```

What this can provide is an example of tactilization may be used as a learning environment for anyone interested in the data and these people may gain some new insight they would have reached purely through visuals (Wang et al 2013).

I could have used a different form of visualisation element such as a bar chart or line plot, as these elements would have been better suited for a much larger set of data, which is where I started from, it is however still worth noting that aside from some interesting points in the data, the difference between the life expectancy between men and women is still marginal regardless and as such it would still have shown very similar shapes. Any other alternative to the triangles would have shown largely similar trends regardless, which is why the triangles are perfectly acceptable. As for the Haptic feedback, the triangles could actually be considered a better solution for friction, as the jagged surface of most other models would not give the user a flat surface to more clearly feel the friction.

This assignment forced me to use a smaller data, a very small dataset in fact, because I did not have the time to learn and implement enough coding ability in the short time we were given to work within. While is it possible to scale down big data in order to produce some valuable research (Breiger 2015), this is not such an instance and what I have created can only be regarded as a mere demonstration of Haply's device and should be seen as a serious examination of life expectancy in the United States between 1950 and 1970. As such, we cannot take the tactilization seriously as showing us any relevant information (Aggarwal and Ranganathan 2016) and the raw CSV file itself is likely more useful in that regard. A serious tactilization using a small set of data would still require me to use a much larger data set regardless (Martens and Dardenne 1998).

Please note that by default, the tactilization only shows data from 1950 by default and will require changing some values in the code itself in order to show the other years, which is not a problem as the code is required to be seen in an editable form before even being launched as tactilization. This part of the code directly relates to the values added in from gapminder:

```
float numberone = years[0];
float EXPALL = ExpAll [0];
float Male = ExpM [0];
float Female = ExpF [0];
float Base = All [0];
```

While I would have included some function to accomplish this without needing to edit the code itself, I do not consider this to be a problem. All that is required here is to any of these values from [0] to [1] or [2], though it will require all but "All[0]" to be changed in order to match up with the correct year. "All[0]" is the exception because it's the generic value simply used to complete the triangle.

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